November 1985 Vol. X No. 11

ENDANGERED SPECIES

Technical Bulletin Department of interior. U.S. Fish and Wildlife Service
Endangered Species Program, Washington, D.C. 20240

Revised Plant Notice

The Fish and Wildlife Service (FWS) has published an updated and revised notice identifying the vascular plant taxa native to the United States that are being reviewed for possible addition to the Federal List of Endangered and Threatened Plants (F.R. 9/30/85). A major purpose of the notice is to solicit additional comments on the status of these plants and the threats they face in order to assist in determining whether or not to propose listing them under the Endangered Species Act.

The identified plants are placed into one of three categories:

Category 1 comprises those plants for which the FWS has substantial data on biological vulnerability and threats to support a proposal to list them as Endangered or Threatened. Currently, there are 894 taxa in this category. Development and publication of proposed listing rules on these plants are anticipated, but, because of the large number, could take years.

Category 2 contains taxa for which the available information indicates that proposing to list them as Endangered or Threatened is *possibly* appropriate, but for which conclusive data on biological vulnerability and threats sufficient to prepare listing proposals are not currently known to the FWS. Further study will be necessary to ascertain the status of the 1,623 taxa in Category 2. It is likely that some will be found to be not in need of Endangered Species Act protection, while others could be determined in greater peril of extinction than some taxa in Category 1.

Those taxa in Categories 1 and 2 are considered by the FWS as candidates for future listing. Once again, Hawaii has the largest number of candidate plants (747), followed by California (648), Florida (176), and Texas (124). Categories 1 and 2 also contain some taxa whose status in the recent past is known, but that may already be extinct in the wild.

Category 3 is made up of 1,414 taxa that once were being considered for listing as Endangered or Threatened, but that are no longer under consideration. There are three subcategories: 3A—60 taxa for which the FWS has persuasive evidence of extinction; 3B—310 taxa that, on the basis of current taxonomic understanding, do not meet the Endangered Species Act's definition of a "species"; and 3C—the 1,044 taxa that have been found to be widespread and/or not subject to any identifiable threat.

Until they are listed as Endangered or Threatened, none of the plant candidates receive any kind of legal protection; however, it is the policy of the FWS to advise other agencies of these candidates when inquiries are made on spe-

(continued on page 8)

Photo by Charles Sheviak

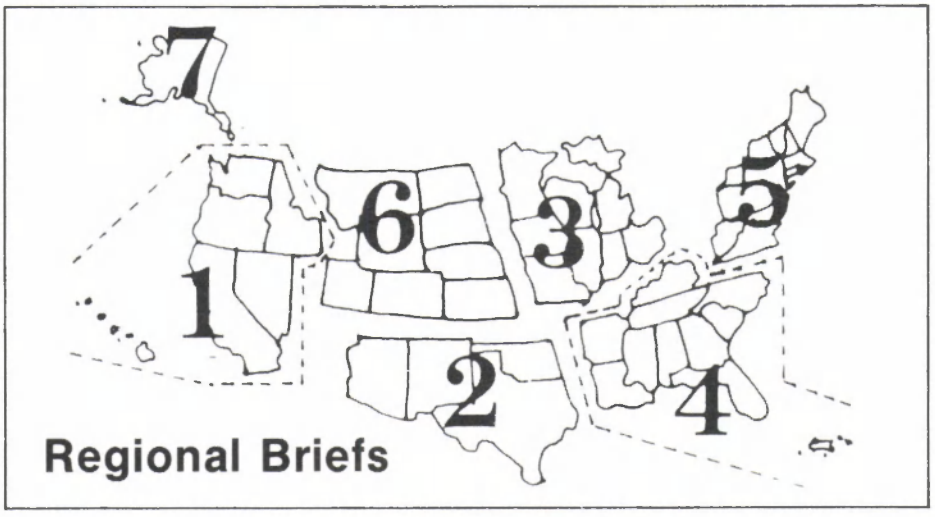
*The fringed prairie orchid (*Platanthera leucophaea*), which faces threats from developers and collectors, is one of 2,517 plant taxa considered candidates for listing.*

Eight Foreign Mammals Proposed for Listing as Endangered

Eight mammals from various parts of the world have been proposed by the FWS for listing as Endangered under the U.S. Endangered Species Act (10/25/85). All occupy very restricted ranges, and are jeopardized by habitat disruption and/or direct killing by humans. Unless they receive adequate protection, the following foreign mammals could become extinct:

- Baluchistan bear (*Ursus thibetanus gedrosianus*)—A small subspecies of the Asiatic black bear, this animal is generally reddish brown in color. Originally, it occurred throughout the mountainous parts of Pakistan, but most of its forest habitat has been cut down for agriculture. Farmers that have moved into these cleared areas regard the bear as vermin and kill it whenever present. Consequently, it now is restricted to a relatively small part of south-central Pakistan, although a few may survive in adjacent sections of Iran. Biologists estimate that fewer than 200 remain.
- large-eared hutia (*Capromys auritus*)—Relatively large for a rodent, measuring approximately 30 centimeters (12 inches) in body length, this animal has long, harsh brown fur. It is arboreal, and occurs only in a mangrove swamp on Cayo Fragoso, an island off north-central Cuba. The large-eared hutia was not even known to science until 1970, and it is thought to be rare. Killing of this animal by fishermen and others who visit the island for food is considered the main threat to the species' survival. Hutias are driven into the water where they are slow and clumsy, and thus are easily captured.
- little earth hutia (*C. sanfelipensis*)—Similar in appearance to the large-eared hutia, the little earth hutia also is threatened by take for human consumption. It is found in an area of low, dense vegetation on Cayo Juan Garcia off southwestern Cuba, and may also occur on nearby Cayo Real. This species is considered very rare, and no individuals were found on a 1980 expedition to Cayo Juan Garcia.
- dwarf hutia (*C. nana*)—Somewhat smaller than the above rodents, the

(continued on page 6)



Endangered Species Program regional staffers have reported the following activities for the month of October:

Region 1—The draft Environmental Impact Statement for the issuance of an Endangered Species Act Section 10(a) permit for the Coachella Valley fringe-toed lizard *(Uma inornata)* was sent out recently by the Fish and Wildlife Service (FWS) for review, and a public hearing to solicit comments on the document was held in Palm Springs, California. In mid-August, the FWS acquired $4.7 million worth of habitat that will become part of the Coachella Valley Preserve (CVP). The management agreement for the CVP is nearing completion and should be signed in the near future. Field work on lizard population levels is proceeding, and the first year's data indicate healthy populations.

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A recently completed rangewide trapping survey (August 1984-August 1985) for the Morro Bay kangaroo rat *(Dipodomys heermanni morroensis)* indicated that only one active population site exists: the Bayview area of Los Osos, California. After more than 4,800 trap-nights, the survey confirmed the species at only one other site when an adult male was captured near Buckskin Drive. The Buckskin site lies approximately 1½ to 2 miles east of the other. The two sites are separated by several blocks of dense housing, a shopping center, and many small business developments.

Results of this survey further corroborate that the Bayview area supports the largest and perhaps only remaining population of the Morro Bay kangaroo rat within its historical range. The single adult male captured at Buckskin is thought to be a lone individual moving through remnant habitat; however, it is still possible that small, transient populations exist in other remnant areas.

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The number of known peregrine falcon *(Falco peregrinus)* nesting pairs in California increased from 64 in 1984 to 77 in 1985. Sixty-two of these pairs produced 106 young (29 captive-reared nestlings; 77 fledged naturally). Twenty additional falcons were released from hack sites, and two fledged that were cross-fostered to prairie falcons *(Falco mexicanus)*. A total of 128 peregrine falcons were fledged this year in California, and this population continues to recover, although pesticide-induced eggshell thinning remains a chronic problem.

* * *

The FWS has entered into a Memorandum of Understanding (MOU) with the Los Angeles Department of Airports and the California Department of Fish and Game to protect and manage a preserve for the El Segundo blue butterfly *(Euphilotes battoides allyni)* at the remnant sand dunes on the west end of the Los Angeles International Airport. An existing 80-acre parcel inhabited by the El Segundo blue, plus 35 to 40 adjacent acres of restorable habitat, will be protected under the MOU. The remnant dunes also provide habitat for at least two other rare Lepidoptera that would benefit from the El Segundo blue butterfly preserve: the Lora Aborn's moth *(Lorita abornana)* and Henne's Eucosma moth *(Eucosma hennei)*. Until a 1984 survey, neither moth had been observed for nearly 40 years.

(continued on page 14)

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U.S. Fish and Wildlife Service Regions

Region 1: California, Hawaii, Idaho, Nevada, Oregon, Washington, and Pacific Trust Territories. **Region 2:** Arizona, New Mexico, Oklahoma, and Texas. **Region 3:** Illinois, Indiana, Iowa, Michigan, Minnesota, Missouri, Ohio, and Wisconsin. **Region 4:** Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, South Carolina, Tennessee, Puerto Rico, and the Virgin Islands. **Region 5:** Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont, Virginia, and West Virginia. **Region 6:** Colorado, Kansas, Montana, Nebraska, North Dakota, South Dakota, Utah, and Wyoming. **Region 7:** Alaska.

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Endangered Species Act Protection Proposed for Four Plants

The Fish and Wildlife Service (FWS) recently published proposals to add the following four species of plants to the U.S. List of Endangered and Threatened Wildlife and Plants:

Three Florida Shrubs

Protection was recommended on November 1, 1985, for three species of shrubs in the custard-apple family (Annonaceae). The **beautiful pawpaw *(Deeringothamnus pulchellus)*** and **Rugel's pawpaw *(D. rugelii),*** the only species in their genus, were proposed for listing as Endangered, while the **four-petal pawpaw *(Asimina tetramera)*** was proposed as Threatened. All three species are restricted to very small areas of the Florida peninsula, where they are jeopardized by habitat degradation and successional changes in the surrounding vegetation.

Both *Deeringothamnus* species inhabit poorly drained slash pine/saw palmetto flatwoods. They are low-growing shrubs with annual or biennial stems that reach only 4 to 8 inches (10 to 20 centimeters) tall. New stems resprout from the stout taproots after such disturbances as mowing or fires; in fact, the pawpaws are adapted to a natural ground fire cycle in which surface vegetation is burned back every several years.

The beautiful pawpaw has pleasantly scented flowers with creamy white petals that are straight when the flower opens, later becoming recurved. Now extirpated at its type locality and over most of its former range, due at least in part to urbanization in the Fort Myers area, the beautiful pawpaw survives in only two known populations. One is on Pine Island in Lee County, and the other is along a highway near Pirate Harbor in southern Charlotte County. Both populations are on privately owned lands.

Rugel's pawpaw has flowers with straight, oblong, canary-yellow petals. Like the other species, it has declined in numbers and range, and currently it is restricted to an area of southern Volusia County. In 1981, botanists found only 7 populations, which contained a total of fewer than 500 plants. About half of the plants were in a pine flatwoods used for cattle pasture, and most of the rest were in a powerline right-of-way and a recently burned flatwoods. Real estate development is considered a severe threat to this species. All of its populations are on private land near the growing town of New Smyrna Beach, and all but one are within a mile of Interstate Highway 95.

The four-petal pawpaw is larger than the other two species, reaching 3 to 9 feet (1 to 3 meters) in height, with one to several upright stems. Most of its original habitat has been urbanized, but several hundred plants survive on remnants of sand pine scrub in Martin and northern Palm Beach Counties.

*Both the beautiful pawpaw (*Deeringothamnus pulchellus), *iliustrated above, and Rugel's pawpaw (*D. rugelii*) produce cylindrical berries that have pulpy flesh and are yellow-green when ripe. In his 1926 description of the species, botanist J.K. Small gave the beautiful pawpaw the whimsical common name of "squirrel banana."*

Essentially, the species is confined to Jonathan Dickinson State Park, Hobe Sound National Wildlife Refuge (NWR), and several privately-owned tracts. Although the State Park provides protection, small areas are being used for military navigation facilities, which could be altered in the future and affect the four-petaled pawpaw's habitat. Further, the species may occur at sites on or near the refuge where the U.S. Army Corps of Engineers (COE) holds easements for disposal of dredge spoils from the Intracoastal Waterway.

Asimina tetramera and both *Deeringothamnus* species respond well to hurricanes and fires, which control the growth of dense overstory. Without such periodic disturbances, the surrounding trees and other vegetation can eventually shade out the pawpaws. Occasional destruction of their stems may even rejuvenate the pawpaws by stimulating the production of new flowering shoots. With urbanization, however, has come increased fire suppression, which allows competing vegetation to grow and constitutes a threat to all three pawpaw species. Both Jonathan Dickinson State Park and Hobe Sound NWR are implementing prescribed burning as a management tool; however, this effort will benefit only part of the *A. tetramera* habitat and none of the *Deeringothamnus* sites. Infrequent mowing or cutting could help to maintain the open areas needed by these species, although frequent low mowing could be harmful.

Comments on the proposal to list the three Florida pawpaws are welcome from all interested agencies, organizations, and individuals, and should be sent to the Field Supervisor, Endangered Species Field Station, 2747 Art Museum Drive, Jacksonville, Florida 32207 by December 31, 1985.

Serianthes nelsonii

S. nelsonii, a rare tree, is endemic to two of the Mariana Islands in the western Pacific, where it is known in the native Chamorro language as *hayun lagu.* Only two mature trees survive on the U.S. Territory of Guam, and 64 remain on the island of Rota (which is part of the Commonwealth of the Northern Marianas). The species was proposed for listing as Endangered on October 25, 1985.

S. nelsonii reaches 60 feet (18m) or more in height and can have a trunk diameter of nearly 6 feet (1.8 m). Its leaves are about 10 inches (25 cm) long, composed of 20-30 small leaflets in a doubly pinnate pattern. Younger parts of the tree, along with the inflorescence

(continued on next page)

Four Plants

(continued from previous page)

and fruit pods, are covered with rusty-brown "hairs."

Botanists do not know if the tree was ever very common, but extensive areas of native habitat on Guam and Rota have been destroyed by human activities. Some of the early specimens apparently were collected from areas since cleared for the development of Anderson Air Force Base on Guam, and recent clearing of land on Rota for use in agriculture has destroyed limestone forest adjacent to that island's existing *S. nelsonii* population.

In addition to habitat destruction, *S. nelsonii* is threatened by a variety of introduced herbivores. For example, seedlings that have been transplanted from the wild into forest nursery plots have been very susceptible to mealy bug and scale damage, and both of these insects could be affecting trees in the wild. It is known that one of the two trees on Guam is infested by termites. Larger animals are thought to be a problem also. No seedlings taller than 8 inches (20 cm) have been seen recently, and it is believed that they are being eaten by non-native deer and wild pigs.

Because the total *S. nelsonii* population has been reduced to such a low point, it has become more vulnerable to natural hazards, such as storms and wildfires, that would not normally jeopardize the species' overall survival. (Fires resulting from human activities are a threat as well.) Typhoons are common in the region, and at least two of the few remaining trees have already been damaged by high winds.

S. nelsonii already is considered by Guam as endangered and is thereby protected by the territorial government's own endangered species legislation. In December 1981, the Governor of Guam petitioned the FWS to place *S. nelsonii* on the Federal Endangered Species List, an action that would reinforce the existing protection.

The listing proposal did not identify Critical Habitat; however, the U.S. Air Force is aware of the two trees present on Andersen Air Force Base and of the Section 7 habitat conservation responsibilities it will incur if the listing proposal becomes final. There are no known activities on the base that are likely to jeopardize the species.

Comments on the proposal to list *S. nelsonii* as Endangered are welcome, and should be sent to the Regional Director, Region 1 (address on page 2 of the BULLETIN), by December 24, 1985.

* * *

If the proposed listing rules become final, all four species will receive the maximum protection authorized for plants under the Endangered Species Act. Interstate or international trade in listed species is prohibited without an FWS permit. (Seeds from cultivated specimens of Threatened plants are exempt from this prohibition if accompanied by a statement of "cultivated" origin.) Further, it is illegal to remove and reduce to possession listed plants from areas under Federal jurisdiction, except under the circumstances described in recently published regulations (September 30, 1985, *Federal Register,* pp. 39690, 39691). Of the four recently proposed plants, this provision would affect only *Asimina tetramera,* and only those few that occur on Hobe Sound NWR. All of the other plants are on State or private lands.

Under Section 7 of the Act, Federal agencies are required to ensure that any actions they authorize, fund, or carry out are not likely to jeopardize the survival of listed species. The only potential Federal action known at this time that could adversely affect any of the four proposed plants would be COE disposal of dredge spoil near some of the *A. tetramera* sites. If this species is listed, the COE would be obligated to consult with the FWS in order to avoid jeopardy to the species. It should be pointed out that the Section 7 habitat conservation measures would apply to all four species even though the dangers of vandalism and overcollection made it imprudent to designate Critical Habitat.

Photo by Andy Robinson

four-petal pawpaw (Asimina tetramera)

Call for Information on Mussel Die-offs

Several freshwater mussel die-offs have occurred in various rivers throughout the U.S. during 1985. Actually, die-offs have been occurring in the upper Mississippi River since 1982, but the situation has now reached epidemic proportions nationwide. Commercial shell divers estimate that 50 to 75 percent of the mussels in commercial beds are dead or dying. Opinions have been expressed by State agencies and commercial interests that these die-offs may be occurring more frequently than in past decades, and this is an issue that needs cooperative effort for investigation and resolution.

The Virginia Tech Coop Unit is seeking all information, experiences, and opinions on die-off events over the past decade. If there is enough interest, a workshop on mussel die-offs could be convened in 1986 to exchange information and to invite specialists (shellfish pathologists, toxicologists) who can provide information on procedures for investigating these episodic events. If anyone has information that relates to mussel die-offs, knows of individuals who do, or is interested in attending such a workshop, please write: Richard Neves, Cooperative Fish and Wildlife Research Unit, Virginia Polytechnic and State University, Blacksburg, Virginia 24061

Reference Note

All Fish and Wildlife Service notices and proposed and final rules are published in the *Federal Register* in full detail. The parenthetical references given in the BULLETIN—for example: (F.R. 9/3/85)—identify the month, day, and year on which the relevant notice or rule appeared in the *Federal Register.*

Final Protection Given to Four Plants

The following four plants, located in two southern States, were recently given the protection of the Endangered Species Act:

Hoffmannseggia tenella (slender rush-pea)

Hoffmannseggia tenella, a perennial member of the pea family, grows to about 3 to 6 inches (8 to 15 centimeters) tall and has tiny orange flowers that usually appear from early March until June. Historically, this plant was known from two Texas counties, Nueces and Kleberg, but now only two populations are known to exist, both of them in Nueces County.

In 1982, a field survey located one of the populations near Petronila Creek and State Highway 70. Only three individual plants were observed. On November 21, 1984, the FWS proposed to list *H. tenella* as Endangered in an attempt to rescue the apparently diminishing species (see BULLETIN Vol. IX No. 12). Since publication of the proposed rule, approximately 25 additional plants were located at the Petronila Creek site, and about 10,000 others were found at a second locality—a rural cemetery in southern Nueces County. These newly discovered individuals give the species a better chance for survival.

Both populations of the slender rush-pea occur in the Blackland Prairie area of the Gulf Coast Prairie, where the plants grow with native and introduced grasses. King Ranch bluestem *(Bothriochloa ischaemum* var. *songarica)* and Bermuda grass *(Cynodon dactylon)*, introduced into the area for roadside management and range improvement, have escaped into uncultivated areas and severely limited the grassland habitat that is suitable for *H. tenella*. In addition, agricultural development and grazing have destroyed the natural characteristics of the Texas Gulf Coast Prairie, which formerly provided more widespread habitat for the slender rush-pea. Any further modification of the plant's remaining habitat may completely eliminate this extremely vulnerable species. However, with the protection given to *H. tenella* authorized by the November 1, 1985, final listing rule, the species may yet escape extinction.

Cereus eriophorous var. *fragrans* (fragrant prickly-apple)

The fragrant prickly-apple is a columnar species of the cactus family with succulent, cane-like stems that measure from 3 to 16 feet (1 to 5 m) tall. Its nocturnal flowers are scented, white or pink in color, and 3 to 4 inches (7.5 to 10 cm) in diameter; its orange-red fruits measure 2 inches (5 to 6 cm) long. Endemic to the east coast of Florida, this cactus occurs in coastal hammock vegetation, which has largely disappeared as a result of increasing urban development in the State.

Based on recent field work by Florida botanists, the only population of the fragrant prickly-apple known to exist today is located within a limited area of St. Lucie County. It has been extirpated from its other historically known site near Malabar in Brevard County. A second population may exist north of Vero Beach in Indian River County, but its existence has not been verified. At the time the species was proposed for listing as Endangered (see BULLETIN Vol. X No. 4), only 14 individual plants were known to exist, but the subsequent discovery of an additional site increased the number to approximately 200. All of the plants are growing on private land, although they are in proximity to lands owned by the Florida Department of Natural Resources.

While access to the *Cereus eriophorous* var. *fragrans* sites is somewhat restricted, an August 1984 survey showed tracks from off-road vehicles within 50 feet of the cactus at one locality. Because of the low number of plants and their clumped distribution, this cactus is very susceptible to any inadvertent destruction or modification of its habitat. Also, because of its rarity and attractiveness, it could become subject to collection. The prickly-apple produces abundant seeds, and seedlings are now being raised at a botanical garden in Florida. With the protection of the Endangered Species Act recently authorized for the species (F.R. 11/1/85), its chances for survival may increase.

Dicerandra frutescens (scrub mint) and *Dicerandra cornutissima* (longspurred mint)

These two members of the mint family, restricted to very small areas in central Florida, were proposed for listing as Endangered on March 29, 1985, because of threats to their survival from rapidly expanding commercial and residential development (see BULLETIN Vol. X No. 4). Now, with the final listing rule in effect (F.R. 11/1/85), both *Dicerandra frutescens* and *Dicerandra cornutissima* will be protected from further destruction of their habitats.

D. frutescens is a strongly aromatic plant that grows up to 1.6 feet (0.5 m) tall with erect non-woody shoots growing from a woody base. Its tubular flowers are borne in pairs and are white or pale pink with purplish-rose dots. *D. cornutissima* is very similar in appearance to *D. frutescens* and exudes the same pleasant, minty smell. Although *D. cornutissima* was confused with *D. frutescens* for many years, the two are readily distinguishable. *D. cornutissima* has narrower leaves, its flowers are borne in groups rather than pairs, and the flowers are purple-rose with deep purple markings.

The scrub mint apparently has always been rare and confined to a small region in the sand pine scrub community of Highlands County. Today, it is known from only two areas in the county, one near Lake June in Winter and the other at the Archbold Biological Station, a privately funded research facility. The species has been extirpated from three other sites where it once existed. The population of *D. frutescens* in the Lake June in Winter area is surrounded by developments along U.S. Highway 27, and its habitat is prime property for any continued development. The populations that occur on Achbold Station are largely undisturbed by people, except for vehicular traffic on the fire lanes. A fire management plan in effect for a major portion of the station's approximate 4,300 acres (1,740 hectares) should maintain sufficient open-type scrub habitat to ensure long-term survival of the species there.

The longspurred mint was formerly known from both Sumter and Marion Counties, but now this species is known from only a single area about 11 miles south-southwest of Ocala in Marion County. Much of this area is being developed, and there is a possibility that the fewer than 4,000 plants there could be eliminated if the development continues.

Both *D. cornutissima* and *D. frutescens* are highly visible and occur in areas close to highways, where they are easily collected or destroyed by road maintenance. Woodlander, Inc., a nursery in Aiken, South Carolina, has successfully propagated both species and has sold potted specimens in limited quantities. Some of these plants are now in cultivation at a Florida botanical garden. Captive propagation may have a role in restoring these two species to their native habitat.

Eight Mammals

(continued from page 1)

dwarf hutia also is taken by people that visit its sole remaining habitat, the Zapata Swamp, about 100 kilometers (62 miles) southeast of Havana, Cuba. This species once occurred over a much larger part of the island. Draining and agricultural development is a threat to its remaining habitat.

- Cabrera's hutia *(C. angelcabrerai)*—Discovered only in 1974, the Cabrera's hutia has not been seen again since 1975. If any remain, they apparently are confined in low numbers to mangrove swamps on a few small islands in the Cayos de Ana Maria group off south-central Cuba. In appearance, this animal is similar to the dwarf hutia, and it also has been taken by people for food.
- Leadbeater's possum *(Gymnobelideus leadbeateri)*—This marsupial is found in the coastal forests of southeastern Australia. It apparently requires habitat containing mature mountain ash trees over 150 years old that contain hollows suitable for nesting. Many such trees were killed by fire in the 1930's, and most of the possum's remaining range is within areas scheduled for logging.
- buffy tufted-ear marmoset (*Callithrix jacchus aurita)*—Found in very low numbers in an extremely small area in southeastern Brazil, this primate depends entirely on forest habitat, nearly all of which already has been cleared for agriculture, logging, and industrial purposes.
- southern bearded saki *(Chiropotes satanas satanas)*—This primate occurs south of the Amazon River in east-central Brazil. It depends on tropical rain forests, and seems partial to undisturbed habitat. Due to the region's rapidly growing human population, the saki's range is disappearing. Exploitation is another threat to this species; primates in general historically have been heavily exploited for commercial and scientific purposes. Further, the tail of the southern bearded saki is used by some people as a duster, and was being commonly sold in the city of Belem, Brazil, in the late 1970's.

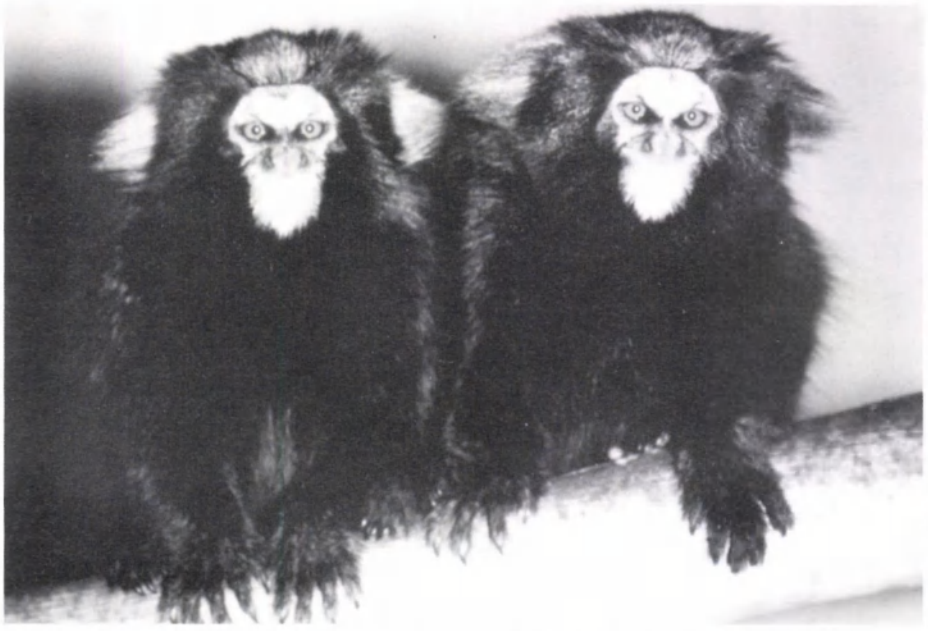

Photo by R. Mittermeier, courtesy of World Wildlife Fund-U.S.

Buffy tufted-ear marmosets are small primates characterized by unique white ear tufts and black head markings.

Photo by G. Lewis, courtesy of World Wildlife Fund-U.S.

Leadbeater's possum (Gymnobelideus leadbeateri)

Photo by R. Mittermeier, courtesy of World Wildlife Fund-U.S.

Chiropotes satanas satanas, *a rare Brazilian subspecies of the bearded saki (above), is threatened by destruction of its tropical rain forest habitat and commercial exploitation.*

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The listing proposal was based upon data gathered by the International Union for Conservation of Nature and Natural Resources (IUCN), whose Conservation Monitoring Centre in the United Kingdom draws upon authorities from around the world. All eight mammals are already classified as endangered in *The IUCN Mammal Red Data Book.*

If the listing proposal becomes final, these mammals will receive the protection authorized for foreign animals under the U.S. Endangered Species Act. It is illegal for any person under U.S. jurisdiction to take, import or export, or engage in international or interstate trade in Endangered species without an FWS permit. Further, it is illegal to pos-

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Eight Mammals

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sess, sell or transport any such wildlife that has been taken in violation of the Act.

Section 8(a) of the Act authorizes limited financial assistance for programs that the Secretary of the Interior determines to be necessary or useful for the conservation of Endangered species in foreign countries. Sections 8(b) and 8(c) authorize the Secretary to encourage conservation programs for foreign endangered species, and to provide assistance for such programs in the forms of personnel and training.

The buffy tufted-ear marmoset and the Baluchistan bear are on Appendix I of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), meaning that people wanting to import these species into the U.S. first must obtain an import permit from the U.S. CITES Management Authority (the FWS Federal Wildlife Permit Office) and an export permit from the country of origin. The southern bearded saki is on CITES Appendix II, which means that imports must have an export permit from the country of origin. All eight mammals will be evaluated by the FWS to determine whether or not they would benefit from additional protection under CITES or other international conservation treaties.

Comments on the proposal to list these eight foreign mammals as Endangered are welcome, and should be sent to the Director (OES), Broyhill 500, U.S. Fish and Wildlife Service, Washington, D.C. 20240, by December 24, 1985.

Tinian Monarch Flycatcher Apparently Thriving

The Tinian monarch flycatcher *(Monarcha takatsukasae)*, a small songbird endemic to the island of Tinian in the western Pacific Ocean, apparently is thriving and is not in need of Endangered Species Act protection. Accordingly, the FWS has proposed removing this bird, now classified as Endangered, from the U.S. List of Endangered and Threatened Wildlife (F.R. 11/1/85).

Much of the native forest habitat on Tinian was destroyed due to clearing of land for suger cane production and, later, military action during World War II. Since 1945, however, the island has been revegetated by an introduced woody shrub, *Leucaena leucocephala,* planted by the U.S. military. The Tinian monarch seems to have adapted well to the scrubby, second growth habitat. Forest bird surveys conducted by the FWS in 1982 found the monarch to be the second most abundant bird on the island, with an estimated population of 40,000.

Although agricultural development, military training exercises, and an expanding human population will probably result in the future loss of some forest habitat, most of Tinian is expected to remain in a forested condition favorable to the monarch. There are no known serious avian diseases or predators on Tinian; however, there is some concern that the increase in use of the island by the military could lead to the accidental introduction of a predator like the brown tree snake *(Boiga irregularis)*, which is blamed for decimating Guam's native bird life. Both the Department of Defense and the FWS are working to control this snake on Guam and prevent its spread to other islands in the region.

If the proposal to delist the Tinian monarch flycatcher becomes final, this bird will no longer receive direct Endangered Species Act protection. There are, however, four other species of birds on Tinian that are listed as Endangered: the Mariana mallard *(Anas austaleti)*, Mariana gallinule *(Gallinula chloropus guami)*, Vanikoro swiftlet *(Aerodramus vanikorensis)*, and La Perouse's megapode *(Megapodius laperouse)*. Therefore, any major Federal action on the island probably would still require consultation with the FWS under Section 7 of the Act. Further, the Tinian monarch is still, and will remain, under the protection of the Commonwealth of the Northern Marianas Fish and Game Law.

Comments on the proposed delisting are welcome, and should be sent to the Regional Director, Region 1 (address on page 2), by December 16, 1985.

Photo by H D Pratt

Tinian monarch flycatcher

Diseases Strike Site of Only Known Black-footed Ferret Population

Region 6 Endangered Species Office

The black-footed ferret *(Mustela nigripes)* once ranged over much of the western United States, but currently is known to survive in only one small population near Meeteetse, Wyoming. The ferret's primary food is the prairie dog. In June 1985, dead prairie dogs from the Meeteetse prairie dog population were collected and analyzed by the Plague Branch of the Centers for Disease Control (CDC), in Fort Collins, Colorado. They were found positive for sylvatic plague.

Insecticide application to control fleas began July 6, 1985, and continued through September 13. At the recommendation of CDC, the mouth of each prairie dog burrow was dusted with Sevin, a common insecticidal powder. As prairie dogs moved through their burrows, Sevin dust would cling to their feet and fur, killing fleas both on the animals and in nests deeper within the burrows.

Insecticide dusting crews included personnel from the Plague Branch, CDC; Wyoming Game and Fish Department; U.S. Fish and Wildlife Service (FWS); BIOTA Research, Inc.; Bureau of Land Management; U.S. Forest Service; National Park Service; University of Wyoming; University of Northern Colorado; Nebraska Game and Parks Commission; Utah Division of Wildlife; and the Colorado Division of Wildlife. Crew members were recruited by Dave Belitsky, Wyoming Game and Fish Department, and Max Schroeder, FWS. Daily field work was coordinated and led by Susan Ball, also with the FWS.

A total of 6,200 acres were treated. The remaining untreated areas are principally in inactive colonies. Results of the treatment for plague cannot be fully evaluated until summer 1986. We currently believe, however, that the impact of the disease has been significantly reduced. Prairie dogs remain abundant in most of their original colonies.

Because there is currently only one known population of black-footed ferrets in the world, a great deal of concern has been voiced that a natural disaster, plague, or other diseases could drive the species into extinction. Fears intensified when spotlight surveys conducted during last August's field season indicated the presence of only 58 ferrets. This was fewer than were observed in

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Blackfooted Ferret

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either 1983 or 1984. During the fall capture-recapture studies, estimates of the population showed a further drop to 29 animals by September 13, not counting two that had been taken into captivity. Although sylvatic plague was considered a possible cause for the decline, no supporting evidence or literature could be found.

On October 22, 1985, a meeting was held at the Wyoming Game and Fish Department to discuss the ferrets' decline and plan a course of action. At this meeting, Wyoming Game and Fish Department personnel announced that one of six ferrets then in captivity at a research center in Sybille, Wyoming, had died of canine distemper and that a second ferret was sick. (This second sick ferret later died.) Both animals showed signs of the disease 1 to 3 days after capture. The incubation period for the virus ranges from about 7 to 14 days, which means that they contracted the disease in the wild.

Attendees agreed that, to preserve the species, additional ferrets must be brought into captivity. As of November 18, four ferrets (one healthy and three sick with canine distemper) were isolated at the original research facility and six were in individual isolation at another location in Wyoming. Efforts to survey for additional ferrets are currently planned through November.

The Wyoming Game and Fish Department and the FWS are committed to a long-term captive propagation effort as the best alternative for creation of a new ferret population in the wild.

Endangered Wildflowers Calendar

The *1986 Endangered Wildflowers Calendar*, now available for purchase from the American Horticulture Society (AHS), features color photographs and information on some of our nation's vulnerable plants. It is designed to increase awareness of the problems facing these rare taxa and to promote their survival. Proceeds from the calendar sales will support AHS plant conservation efforts, including the Wildflower Rediscovery Awards Project, which rewards individuals and organizations that provide confidential information on any plant previously thought to be extinct.

To order, send $6.95 (postage and handling included) to AHS, P.O. Box 0105, Mount Vernon, Virginia 22121. (AHS members can purchase the calendar for $6.25.) For a listing of plants thought to be extinct, send a self-addressed, stamped (39¢) envelope.

Revised Notice

(continued from page 1)

cies that are already listed or proposed for listing. Federal land-managing agencies and others with the authority to conserve species prior to their listing under the Act now have a more up-to-date guidance document. Earlier consideration of these taxa in the planning process should lead to fewer potential land-use conflicts, since there is likely to be greater flexibility when accommodating the needs of such plants at an early stage.

The FWS requests any additional data on the plants contained in the revised notice, as soon as possible and on a continuing basis. Comments should be addressed to the appropriate Regional Directors (addresses on page 2 of the BULLETIN) or the Director (OES), 500 Broyhill Building, U.S. Fish and Wildlife Service, Washington, D.C. 20240. Copies of the plant notice are available from the Washington office.

America's Desert Fishes: Increasing Their Protection Under the Endangered Species Act

by
Jack E. Williams[1]
and
Donald W. Sada[2]

"This little fish occurs in the shallow pools along the (Owens) river. It abounds in the bog pastures and tule swamps, and enters the irrigation ditches in large numbers..."

-John Otterbein Snyder on the distribution of the Owens pupfish in 1917. By 1960, this pupfish had been reduced to about 200 individuals in a single, marshy pool in Fish Slough, Owens Valley, California.

* * *

For people in the desert, water always has been a precious commodity. For fishes and other aquatic species in the desert, however, water is life itself.

Fishes may seem few and far between in the desert. Nevada, for example, has only 45 fish species native to its waters. On the other hand, a smaller, midwestern State (Missouri, for example) may have nearly 200 native species of fishes. The distribution of many midwestern fishes extends over two or more States, but many fishes from desert regions are restricted to small, isolated valleys, and a surprising number are endemic to a single spring.

Those desert fishes that do exist are marvelously adapted to their unique environments. The humpback chub *(Gila cypha)*, for example, has a pronounced dorsal hump and deeply-forked caudal fin, features that make this fish ideally suited for life in the turbulent flows of the Colorado River. Other specialized species, such as pupfish, can survive and reproduce in small springs where the salinity is many times that of seawater.

Desert fishes often are highly restricted in distribution. As the western United States has been developed, the already limited habitats of many desert fishes have been drained, diverted, dammed, channelized, or even pumped dry. This loss of habitat is reflected in the number of desert fishes that are listed by the Fish and Wildlife Service (FWS) as Threatened or Endangered. Of the 54 listed fishes in the United States, 40 (or 74 percent) are from the desert areas of the West. These areas include the Sonoran, Chihuahuan, Mohave, and Great Basin Deserts, and the Colorado Plateau.

The status of native fishes is an excellent indicator of the health of aquatic habitats in the desert. These habitats support not only fishes, but a wealth of rare invertebrates and other organisms as well. When Devil's Hole was protected from overdraft of subsurface waters, an action that prevented extinction of the Devils Hole pupfish *(Cyprinodon diabolis)*, an endemic snail and riffle beetle on the site also were saved. Highly restricted (and often undescribed) species of invertebrates are commonly found in springs and sloughs inhabited by rare desert fishes. Malacologists estimate that at least nine species of snails,

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2800 Cottage Way, Room E - 1823
Sacramento, California 95825

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4600 Kietzke Lane, Building C
Reno, Nevada 89502

Desert Fishes

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including an undescribed genus, are endemic to springs in Ash Meadows, Nevada. (See the Ash Meadows feature in BULLETIN Vol. VII No. 6.) Although not currently listed as Endangered or Threatened, these snails receive protection through the listing of the Warm Springs pupfish *(Cyprinodon nevadensis pectoralis)*, Ash Meadows Amargosa pupfish *(C. n. mionectes)*, and Ash Meadows speckled dace *(Rhinichthys osculus nevadensis)* that inhabit the same springs.

Photo by Tom Baugh

Devils Hole pupfish

Increasing Legal Protection

The past 3 years have witnessed considerable progress in listing proposals for desert fishes. Twenty-two fishes have been proposed during this time for official Endangered or Threatened status, and final action has been taken on 15 species. In addition, final listing rules are expected to be published for ten rare desert fishes within the next year. These fishes are shown on Table 1 and on the accompanying map. By comparison, Table 2 includes a total of 22 desert fishes listed prior to 1983. Much of the recent listing action was precipitated by an April 4, 1983, petition by the Desert Fishes Council to add 17 desert fishes to the U.S. List of Endangered and Threatened Wildlife.

Why are Desert Fishes Vanishing?

Despite the increased listing activity, desert fishes and their habitats are disappearing faster than we can protect them. The reasons for these losses vary.

With the majority of land within most western States in public ownership, proper management of aquatic habitats might seem a relatively simple matter. However, since most lands with a permanent water supply were recognized by early settlers as valuable, most water sources are in private ownership. Even when land is publicly owned, management often has been focused on priorities other than the maintenance of a viable ecosystem. Many streams occupied by the Lahontan cutthroat trout *(Salmo clarki henshawi)*, for example, have suffered from overgrazing by cattle. In arid or semi-arid environments, cattle are attracted to water sources and the surrounding riparian vegetation. If overgrazed, these riparian habitats are denuded and become subject to soil compaction and erosion. In recognition of this problem, most Critical Habitat areas for desert fishes include the adjacent riparian habitat. Habitats of other rare desert fishes, particularly the Warner sucker *(Catostomus warnerensis)*, desert dace *Eremichthys acros)*, Foskett speckled dace *(Rhinichthys osculus* ssp.), Fish Creek Springs tui chub *(Gila bicolor euchila)*, and Railroad Valley springfish *(Crenichthys nevadae)* also have been damaged by overgrazing.

Water diversions for agricultural or municipal purposes also threaten many desert fishes. Many spring habitats in Ash Meadows, Nevada, for example, have been diverted, drained, and channelized for the benefit of short-term farming programs that eventually failed because of the area's highly alkaline soils.

The warm climate and relatively stable temperatures of many desert springs provide an opportune environment for non-native, tropical fishes. When introduced into desert springs and creeks, these exotics often flourish and soon greatly outnumber the native species. Guppies *(Poecilia reticulata)* have literally taken over Big Warm Springs from the Railroad Valley springfish. Convict cichlids *(Chichlasoma nigrofasclatum)* now are abundant in several Pahranagat Valley (Nevada) springs, including those of the White River springfish *(Crenichthys baileyi baileyi)* and Hiko White River springfish *(C. b. grandis)*. Mosquitofish *(Gambusia affinis)* also have been widely and indiscriminantly introduced into many western U.S. waters, purportedly for mosquito control. Ironically, mosquitofish have often replaced native pupfishes, which are equal to or better for control of the aquatic mosquito larvae.

Too Little, Too Late

Concern for desert fishes has grown in response to the large number of extinct species and the increasing number of species recognized as being imperiled. By the time that the Endangered Species Act was passed in 1973, more than 10 fish taxa historically known from the Southwest had become extinct, and 19 others were listed by the FWS as Threatened or Endangered. Conservation laws may be slowing the rate of extinction, but the number of listed fish species is rapidly increasing and has made the number of proposed and listed fish species greater for the Southwest than for any other part of the U.S.

Table 3 summarizes the recently extinct fish species within the Southwest. These species generally succumbed to factors that continue to threaten many aquatic organisms in desert regions. Habitat alteration resulting from the development of water resources is to blame for most of the extinctions. This type of development includes depletion of groundwater, which causes springs and creeks to dry. Groundwater depletion, for example, eliminated populations of the Raycraft Ranch and Pahrump Ranch poolfishes *(Empetrichthys latos concavus* and *E. l. pahrump)*. Diversion of spring outflows into earthern or concrete canals eliminated the Pahranagat spinedace *(Lepidomeda altivelis)*, and the Shoshone, Tecopa, and Monkey Spring pupfishes *(Cyprinodon nevadensis shoshone, C. n. calidae,* and *C. sp.)*. The construction of dams impounded large sections of rivers and adjacent areas, eliminating habitats occupied by the Amistad gambusia *(Gambusia amistadensis)* and Rio Grande bluntnose shiner *(Notropis simus simus)*.

The establishment of predatory and/or competing exotic species is the

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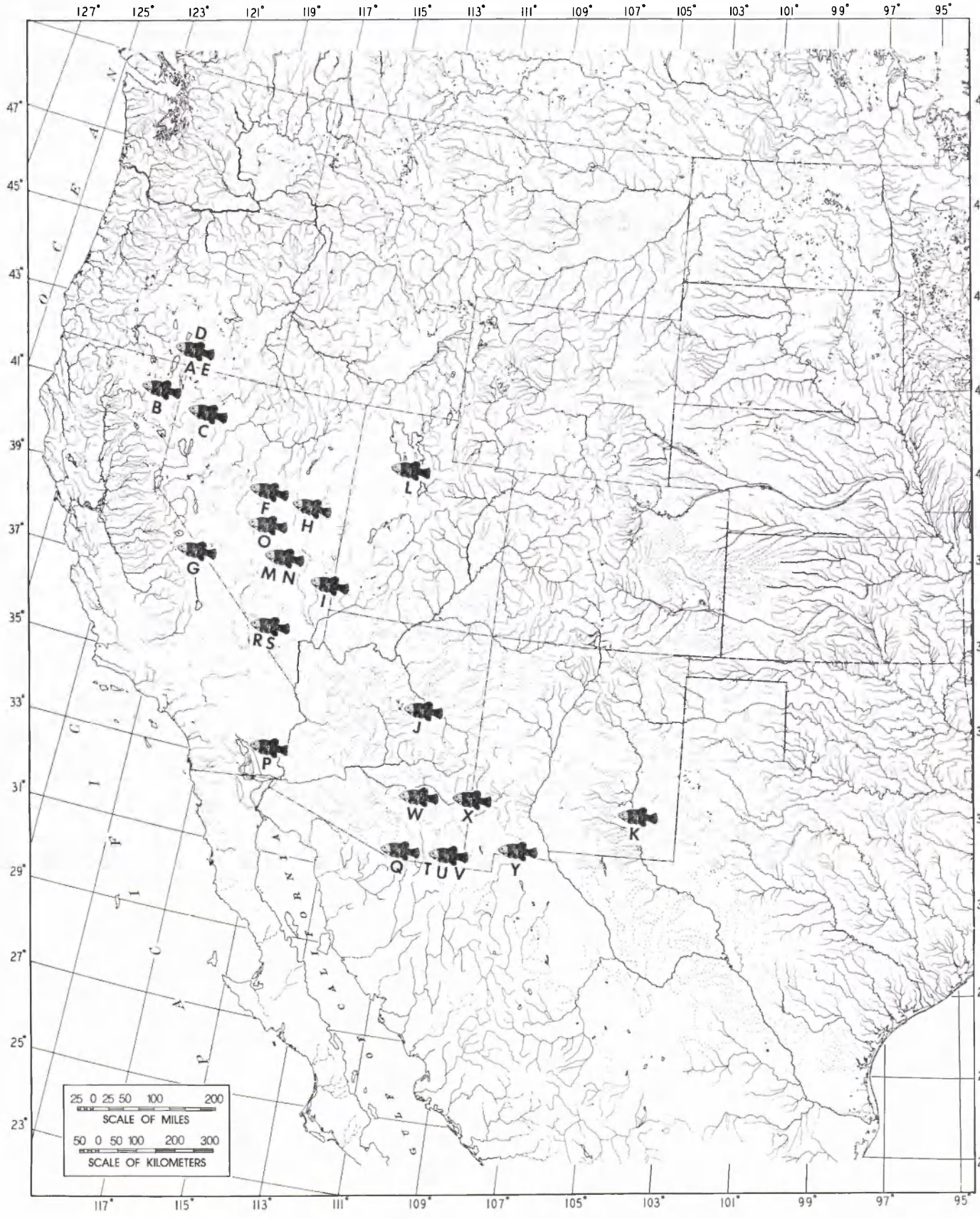
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Table 1. Summary of rules to add desert fishes to the List of Endangered and Threatened Wildlife during the past two years. Dates refer to publication of proposed and final rules in the *Federal Register*.

Map Symbol	Species	Classification	Proposed	Final
A	*Warner sucker *Catostomus warnerensis*	T	5/21/84	9/27/85
B	*Modoc sucker *Catostomus microps*	E	1/31/84	6/11/85
C	*Desert dace *Eremichthys acros*	T	5/29/84	pending
D	*Hutton Spring tui chub *Gila bicolor* ssp.	T	4/17/84	3/28/85
E	*Foskett speckled dace *Rhinichthys osculus* ssp.	T	4/17/84	3/28/85
F	*Fish Creek Springs tui chub *Gila bicolor euchila*	T	6/06/84	pending
G	*Owens tui chub *Gila bicolor snyderi*	E	3/28/84	8/05/85
H	*White River spinedace *Lepidomeda albivallis*	E	5/29/84	9/12/85
I	*Big Spring spinedace *Lepidomeda mollispinis pratensis*	T	11/30/83	3/28/85
J	*Little Colorado spinedace *Lepidomeda vittata*	T	5/22/85	pending
K	*Pecos bluntnose shiner *Notropis simus pecosensis*	T	5/11/85	pending
L	*June sucker *Chasmistes liorus mictus*	E	7/02/84	pending
M	*White River springfish *Crenichthys b. bailayi*	E	5/07/84	9/27/85
N	*Hiko White River sprlngfish *Crenichthys b. grandis*	E	5/07/84	9/27/85
O	*Railroad Valley springfish *Crenichthys nevadae*	T	4/17/84	pending
P	*Desert pupfish *Cyprinodon macularius*	E	5/16/84	pending
Q	Sonora chub *Gila ditaenia*	T	7/06/84	pending
R	Ash Meadows speckled dace *Rhinichthys osculus nevadensis*	E	1/05/83	9/02/83
S	Ash Meadows Amargosa pupfish *Cyprinodon nevadensis mionectes*	E	1/05/83	9/02/83
T	*Yaqui chub *Gila purpurea*	E	6/15/83	8/31/84
U	Yaqui catfish *Ictalurus pricei*	T	7/15/83	8/31/84
V	Yaqui beautiful shiner *Notropis formosus*	T	7/15/83	8/31/84
W	Loach minnow *Tiaroga cobitis*	T	6/18/85	pending
X	Spikedace *Meda fulgida*	T	6/18/85	pending
Y	Chihuahua chub *Gila nigrescens*	T	12/15/80	10/11/83

**Taxa petitioned for listing by the Desert Fishes Council.*

second largest factor in the extinction of native desert fishes. The Ash Meadows poolfish *(Empetrichthys merriami)* disappeared following establishment of aquarium fishes, crayfish, and bullfrogs in its thermal spring habitats. The Independence Valley tui chub *(Gila bicolor isolata)* could not withstand predation from intoduced largemouth bass *(Micropterus salmoides)*, and the Grass Valley speckled dace *(Rhinichthys osculus reliquus)* could not survive introductions of rainbow trout *(Salmo gairdneri)* and brook trout *(Salvelinus fontinalis)* into its sole spring habitat.

Other species, however, were more fortunate, and were rescued from extinction. The Pahrump poolfish *(Empetrichthys l. latos)* was rescued from its sole locality in Manse Spring (Pahrump Valley, Nevada) shortly before nearby groundwater pumping caused the spring to fail. It survives in three refugia within Nevada, but is extinct in its native habitat.

Conservation Needs

The extremely localized distribution and small populations of many desert fishes often make the establishment of refugia an important aspect of conservation programs. Refugia populations are not intended to replace native populations within their natural habitats, but to serve as necessary backup genetic resources that provide a source for reestablishing extirpated populations. Unknown aspects of a species' life history, along with land use changes near the refugia, often make it difficult to maintain these artificial populations.

Difficulties in constructing and rehabilitating quality habitat were encountered during efforts to establish a refugium population of the Devils Hole pupfish, and during efforts to reestablish the Moapa dace *(Moapa coriacea)* within portions of its native habitat on the Moapa National Wildlife Refuge in Nevada. Initial translocations of both species were unsuccessful. Success was achieved only after field investigations revealed how these environments must be constructed in order to provide the habitat requirements peculiar to each species.

The degree of a species' vulnerability frequently is of primary influence in the design of specific conservation programs. For example, the southwestern U.S. fish fauna includes a number of species that occupy single springs. These taxa are highly susceptible to extirpation from single episodes of vandalism or unexpected habitat alteration. Providing maximum protection in these instances usually can be accomplished only by purchase of the habitat through fee acquisition or by conservation easements. In the past, such acquisition has been conducted by both private organizations and the Federal Government. In some cases, the acquired habitat can accommodate multiple use if compatible with the conservation of listed species.

Reversing the Slide Toward Extinction

Substantial progress has been made toward preventing further extinctions of desert fishes. The first step toward conservation comes in recognizing the precarious status of a declining species. This occurs when the FWS learns of the problem and determines that a species should be included on the U.S. List of Endangered and Threatened Wildlife.

(continued on page 12)

Table 2. Desert fishes included in the List of Endangered and Threatened Wildlife prior to 1983.

Species	Historical Range	Status	When Listed
Apache trout *Salmo apache*	AZ	T	1967
Gila trout *Salmo gilae*	NM	E	1967
Lahontan cutthroat trout *Salmo clarki henshawi*	CA, NV	T	1970
Paiute cutthroat trout *Salmo clarki seleniris*	CA	T	1967
Borax Lake chub *Gila boraxobius*	OR	E	1982
Mohave tui chub *Gila bicolor mohavensis*	CA	E	1970
Humpback chub *Gila cypha*	AZ, CO, UT, WY	E	1967
Bonytail chub *Gila elegans*	AZ, CA, CO, NV UT, WY	E	1980
Pahranagat roundtail chub *Gila robusta jordani*	NV	E	1970
Moapa dace *Moapa coriacea*	NV	E	1967
Woundfin *Plagopterus argentissimus*	AZ, NV, UT	E	1970
Colorado squawfish *Ptychocheilus lucius*	AZ, CA, CO, NM NV, UT, WY	E	1967
Cui-ui *Chasmistes cujus*	NV	E	1967
Pahrump poolfish *Empetrichthys latos*	NV	E	1967
Devils Hole pupfish *Cyprinodon diabolis*	NV	E	1967
Comanche Springs pupfish *Cyprinodon elegans*	TX	E	1967
Warm Springs pupfish *Cyprinodon nevadensis pectoralis*	NV	E	1970
Owens pupfish *Cyprinodon radiosus*	CA	E	1967
Amistad gambusia *Gambusia amistadensis*	TX	E	1980
Big Bend gambusia *Gambusia gaigei*	TX	E	1967
Pecos gambusia *Gambusia nobilis*	NM, TX	E	1970
Gila topminnow *Poeciliopsis occidentalis*	AZ, NM	E	1967

Photo by Tom Baugh

Pahrump poolfish

Listing of a species initiates considerable effort directed toward preventing extinction and enhancing a species' status. Among the conservation measures that go with a listing are prohibitions on take (with some exceptions), possession, and interstate or international trafficking in listed species without an FWS permit. Listing also obligates Federal agencies to ensure that any actions they fund, authorize, or carry out are not likely to jeopardize listed species or adversely modify their Critical Habitats. Another important benefit is the requirement for the FWS to develop and implement recovery plans for all listed species in the U.S. These recovery plans are intended to enhance the status of a vulnerable species so that it is no longer Threatened or Endangered and, therefore, may safely be removed from the list.

The Dexter National Fish Hatchery in New Mexico is one FWS facility aimed at preventing the extinction of desert fishes. It is operated as a large refugium and production facility for some of the rarest species. Individuals of the 15 taxa currently being maintained at Dexter not only provide security against extinction, they are a "pool" of stock for reestablishing populations where conservation efforts have successfully ensured long-term protection of native habitat.

Private and public acquisition of habitat for rare fishes has increased during the past 10 years. The Nature Conservancy (TNC) has led purchases of habitats that include Ash Meadows, Nevada (for the Ash Meadows Amargosa, Warm Springs, and Devils Hole pupfishes, and the Ash Meadows speckled dace); Condor Canyon, Nevada (for the Big Spring spinedace, *Lepidomeda mollispinis pratensis)*; and Borax Lake, Oregon (for the Borax Lake chub, *Gila boraxobius*). TNC also has been involved in discussions regarding protection of many other habitats. In many instances, TNC acts as an intermediary landowner that purchases unique habitats for eventual resale to appropriate public agencies at original purchase cost. In others, TNC manages the land itself or cooperatively with another entity.

The FWS manages three national wildlife refuges (NWRs) for the protection of endangered desert fishes and their ecosystems. Moapa and Ash Meadows NWRs are in southern Nevada, and San Bernardino NWR is in southeastern Arizona. Purchase of Ash Meadows and the San Bernardino Ranch was assisted by TNC. Moapa and Ash Meadows are thermal spring areas that also support a variety of other rare plants and animals. San Bernardino NWR is a Sonoran desert cienega (wetland) purchased to conserve the Yaqui topminnow *(Poeciliopsis occidentalis sonoriensis)* and Yaqui chub *(Gila purpurea)* that still occupy the area. The Yaqui sucker

(text continues on page 14)

Photo by Tom Baugh

Ash Meadows Amargosa pupfish

Photo by J.E. Williams

Outflow of Big Warm Spring, Railroad Valley, Nevada, before and after the Railroad Valley springfish (Crenichthys nevadae) population was virtually eliminated by conversion of the spring for channel catfish propagation. The facility was installed during January 1982.

Photo by J.E. Williams

Desert Fishes

(continued from previous page)

(Catostomus bernardini), Yaqui catfish *(Ictalurus pricei)*, and Yaqui beautiful shiner *(Notropis formosus)* are other species native to the San Bernardino ecosystem that will be reintroduced in the future.

* * *

On September 17, 1984, the FWS approved the recovery plan for the Owens pupfish mentioned at the beginning of this article. Although far from recovery, thousands of these pupfish now exist in three separate populations. With responsible land management and a greater public awareness of vanishing desert resources, threats to fragile habitats can be minimized and further extinctions prevented. However, the continuing potential for groundwater depletion, river impoundment, and predation and/or competition from continued introductions of exotic species indicate that long-term security for many species still is far from certain.

Table 3. Recently extinct fishes in U.S. deserts.

Species	State
Alvord cutthroat trout *Salmo clarki* ssp.	NV, OR
Pahranagat spinedace *Lepidomeda altivelis*	NV
Las Vegas dace *Rhinichthys deaconi*	NV
Grass Valley speckled dace *Rhinichthys osculus reliquus*	NV
Independence Valley tui chub *Gila bicolor isolata*	NV
Phantom shiner *Notropis orca*	NM, TX, Mex
Rio Grande bluntnose shiner *Notropis simus simus*	NM, TX, Mex
June sucker *Chasmistes liorus liorus*	UT
Ash Meadows poolfish *Empetrichthys merriami*	NV
Raycraft Ranch poolfish *Empetrichthys latos concavus*	NV
Pahrump Ranch poolfish *Empetrichthys latos pahrump*	NV
Tecopa pupfish *Cyprinodon nevadensis calidae*	CA
Shoshone pupfish *Cyprinodon nevadensis shoshone*	CA
Monkey Spring pupfish *Cyprinodon* sp.	AZ
Amistad gambusia *Gambusia amistadensis*	TX
Utah Lake sculpin *Cottus echinatus*	UT

Regional Briefs

(continued from page 2)

* * *

The Sacramento Endangered Species Office (SESO) staff coordinated with personnel from the San Francisco National Wildlife Refuge (NWR), FWS law enforcement division in San Francisco, Environmental Protection Agency (EPA), and U.S. Army Corps of Engineers (COE), and agents of a developer, to stop illegal disking and blading (filling) activities in diked historical baylands that support a substantial population of the Endangered salt marsh harvest mouse *(Reithrodontomys raviventris)*. Despite having sponsored a salt marsh harvest mouse trapping study for a proposed golf course/condominium project, which resulted in the discovery of an extraordinarily large population (41 mice), the developer disturbed this habitat with caterpillar tractors pulling disks. The COE responded quickly, issuing a cease and desist order the same day. After subsequent discussion with the COE, EPA, and FWS, the developer has agreed to cease any "weed abatement" on the property.

* * *

Craig Johnson, a Bureau of Land Management (BLM) biologist who works closely with the FWS' Boise field office, located a new colony of MacFarlane's four o'clock *(Mirabilis macfarlanei)* along the Salmon River near Whitebird, Idaho. With the confirmation of this new colony, there will be a total of nine known extant colonies (six in Idaho and three in Oregon).

* * *

Region 2—Ninety-eight Endangered Gila trout *(Salmo gilae)* were successfully moved from Spruce Creek to Big Dry Creek in the Gila Wilderness in New Mexico. The transfer marked the completion of a 2-year effort to reestablish the Gila trout in Big Dry Creek, and it brings the species one step closer to recovery.

In June 1984, a 1.9 kilometer (1.2 mile) reach at the headquarters of Big Dry Creek was treated with a fish toxicant to rid the stream of exotic trout species. Approximately 3,716 exotic rainbow trout *(Salmo gairdneri irideus)* and brown trout *(Salmo trutta fario)* were killed. However, this treatment was not totally successful, and a second treatment was conducted in June 1985. Natural waterfalls will prevent exotic trout species from reinvading the treated segment of stream.

* * *

The whooping crane *(Grus americana)* that struck a powerline in Idaho during September died in early October as a result of the injuries (see Regional Briefs section of last month's BULLETIN).

The first whooper of the season arrived at Aransas NWR in early October, 2 days earlier than any previous record. By the end of October, at least three whoopers were at Aransas and sightings were being reported in many of the Great Plains States.

The Federal-State Cooperative Plan to protect whooping cranes is operational in 13 States within 3 FWS regions. The plan's main emphasis is to protect or recover whoopers during migration whenever they might be sick or injured, or subject to some hazard such as disease, chemical contamination, or shooting.

The year's first hunt for snow geese *(Chen hyperborea)* at Bosque del Apache NWR in New Mexico was held at the end of October. A single whooping crane present elsewhere on the refuge was not disturbed by the hunting. An objective of the hunts is to encourage continued southward migration of the snow geese wintering flock, which has increased rapidly in recent years. A diminished flock would mean less food competition for the cranes and a reduced hazard of diseases, like the avian cholera outbreak of 1984-85, that are associated with dense bird populations.

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Regional Briefs

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A recent survey conducted by the FWS, Texas Parks and Wildlife Department, and the University of Texas indicates that the Attwater's greater prairie chicken *(Tympanuchus cupido attwateri)* currently occupies 46,000 acres, which represents an 81-percent reduction in habitat since 1967. If this trend continues, it is estimated that the population could decline to 800 birds on 37,000 acres by the year 2000. Currently, the prairie chicken is being successfully managed on the Attwater Prairie Chicken NWR; however, this population is susceptible to being extirpated by a natural disaster or disease. Protection of additional habitat is being considered.

* * *

Region 4—Continued bald eagle *(Haliaeetus leucocephalus)* activity in the North Carolina area during the summer and early fall of 1985 was highlighted by the development of a summer roost. The roost, located near Durham, North Carolina, on the recently completed Jordan Reservoir, has had up to 42 bald eagles, the majority of which were immature and juvenile birds. A great deal of public interest was generated by this roost, so the Wildlife Resources Commission designated a public viewing point along one of the adjacent State highways. The origin of these birds is thought to be Florida.

* * *

In 1980, the first recorded green sea turtle *(Chelonia mydas)* to come ashore to nest on a North Carolina beach was tagged after carrying out her nesting duties. The event occurred on Onslow Beach, part of the Marine Corps Base at Camp Lejeune, North Carolina. This summer, the same female green sea turtle, now weighing about 500 pounds, returned to Onslow Beach and nested again. In 1980, this particular turtle nested four times and laid a total of 819 eggs. This year, it again nested four times and laid a total of 728 eggs.

* * *

The Jacksonville Endangered Species Field Office recently became involved in a plan to protect active bald eagle nests during a mosquito control operation for *Culex nigripalpus*, a carrier of St. Louis encephalitis (SLE), in a coastal Florida county. The county was recently placed on a SLE alert by the State.

Due to the heavy rainfall experienced recently in south Florida, there is a great deal of standing water, even under the eagle nests. Several years ago, buffer zones were established to protect these territories from low-level helicopter spraying. The FWS realized that when these buffers were established, control of the *Culex* mosquito would be necessary from time to time, and the 750-foot buffer zone would have to be modified. At the present time, a reduced horizontal and vertical buffer has been agreed upon to protect the nests and ensure that public health is maintained.

* * *

The Jacksonville Endangered Species Field Station has received a draft final report on a status survey for the rosemary wolf spider *(Lycosa ericeticola)*, a Category 2 invertebrate listing candidate. The spider was previously known only from the type locality near Interlachen in Putnam County, Florida, where it occurred in an area with extensive rosemary *(Ceratiola ericoides)* stands. The status survey, conducted in 1984-1985 by the FWS' Florida Cooperative Fish and Wildlife Research Unit, located the species at twelve additional sites in Putnam County in turkey oak/longleaf pine/rosemary habitat.

Although rosemary is widely distributed throughout Florida, the spider has not been located at rosemary sites outside Putnam County. Longleaf pine communities are threatened throughout the Southeast, so the limited distribution of the rosemary wolf spider makes it vulnerable to eventual habitat loss as suburban development continues in Putnam County. Fortunately, the species occurs in part on the University of Florida - Florida State Museum's Ordway Preserve, and thus some of its habitat is protected.

* * *

Region 5—The Region 5 Endangered Species Office staff attended The Nature Conservancy's (TNC) eastern regional conference at Shelter Island, New York, on October 28-30. One purpose of the meeting was to assess the results of this year's cooperative field studies. Personnel from eastern regional offices of TNC and individual State heritage programs have been working with the FWS to systematically determine the rangewide status of 32 plant listing candidates and other invertebrate species that may qualify for Federal protection. As a result of this season's field work, the status of many species has been clarified, and excellent information is now available to support listing proposals for several plant species. This FWS/TNC project is scheduled to continue for at least another year.

* * *

Region 5 personnel hosted an instructional workshop on October 25 for State agencies having approved cooperative plant agreements with the FWS under Section 6 of the Endangered Species Act. State representatives were briefed on administrative procedures, the Federal aid application process, funding priorities, and other aspects of the cooperative agreement program. Seven of the 13 States in the region now have cooperative plant agreements, and 5 more States hope to have their agreements finalized soon.

* * *

Region 6—Two members of the Gray's Lake, Idaho, whooping crane flock spent considerable time this fall roosting and feeding near Ft. Collins, Colorado, an area located east of the Rocky Mountain Front Range and east of the cranes' previous migratory path (see last month's Regional Briefs section). Public interest in these birds was impressive. After observation by many of the local citizens, a large number of avid birdwatchers, and some out-of-State visitors, both birds were reported gone from their sites on the morning of October 29.

* * *

Region 7—Recoveries of two American peregrine falcon *(Falco peregrinus anatum)* nestlings banded along the Yukon River in Alaska this summer have been reported. One of the birds was found dead in western North Dakota on September 30, and the other bird was live-trapped in good condition at Dry Tortugas near Key West, Florida. Both are the first Alaska birds recovered in these States. With a band recovery rate approaching 5 percent (1,621 birds banded and 78 returns), the banding program in Alaska continues to provide valuable information on survival rates, migration routes, and wintering habits of peregrines.

* * *

The Aleutian Island Unit of Alaska Maritime NWR carried out recovery efforts for the Endangered Aleutian Canada goose *(Branta canadensis leucopareia)* again this summer. One hundred and thirty-six geese were captured on Buldir Island, and 124 were transported by vessel and released on Amchitka Island. Bad weather, capture paralysis, and bald eagle predation somewhat hampered the transplant effort. Observations of these geese, marked with yellow leg bands and black numerals, can be reported to Dr. Paul Springer, Humboldt State University, at 707/826-4759.

* * *

Region 8 (Research)—The black-capped vireo *(Vireo atricapillus)*, a Category 1 listing candidate, has declined in numbers in recent years throughout its historical breeding range from Kansas to Coahuila, Mexico, primarily due to nest parasitism by cowbirds and destruction of its favored brushland habitat from overgrazing by sheep and goats. A spring 1985 census by Denver Wildlife Research Center biologists revealed 275 adult birds in the State of Texas, including about 164 breeding pairs in 30 sites. A pilot experimental removal of cowbirds from three areas increased production from 2 young (by 24 pairs) in 1984 to 24 young (by 33 pairs) in 1985. These results suggest

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Regional Briefs

(continued from previous page)

that cowbird control in selected areas of adequate vireo habitat may be a viable recovery method. If the population in potentially large breeding areas, such as Big Bend National Park, could be increased to the carrying capacity of its habitat, this species, which disperses readily into available habitat, might recognize parts of its former range.

* * *

The Patuxent Wildlife Research Center reports that a California condor *(Gymnogyps californianus)*, the female member of the Santa Barbara pair and one of only six individuals remaining in the wild, was captured with a cannon net on October 1 and fitted with two new radio transmitters. The attending veterinarian drew blood from the condor for contaminant analysis and indicated she appeared to be in good health. The bird was alert upon release and was observed the following day with her mate near the capture site.

* * *

The Seattle National Fishery Research Center (SNFRC) initiated a 3-year project in Fiscal Year 1984 to obtain life history and ecological information on the Moapa dace *(Moapa coriacea)*. Descriptions of some major accomplishments follow:

Data from a baseline inventory of stream ecosystems on the Moapa NWR in Nevada suggest that, in terms of water chemistry, benthic communities, and available drift items, the mainstem and tributary stream (the only place where successful Moapa dace reproduction is known to occur) are comparable. A status survey of the species was conducted in the Warm Springs area, and the dace population there was estimated at 3,000 individuals—over three times the number of dace than had been thought to exist.

Studies of habitat requirements indicated that adult dace habitat was limited on the Moapa NWR, so a 400-foot section of stream was constructed and added to the refuge. The research team designed the new stream reach and supervised its construction, saving the FWS about $46,000 in contractor fees.

Other information is currently being gathered on Moapa dace reproduction biology, emigration behavior, food habits, and growth and mortality rates. The SNFRC is confident that a large, self-sustaining population of Moapa dace can be established on the refuge within a few years.

BOX SCORE OF LISTINGS/RECOVERY PLANS

Category	ENDANGERED U.S. Only	ENDANGERED U.S. & Foreign	ENDANGERED Foreign Only	THREATENED U.S. Only	THREATENED U.S. & Foreign	THREATENED Foreign Only	SPECIES* TOTAL	SPECIES HAVING PLANS
Mammals	25	19	234	4	0	22	304	23
Birds	60	13	141	3	1	0	218	54
Reptiles	8	6	60	8	4	13	99	18
Amphibians	5	0	8	3	0	0	16	6
Fishes	37	4	11	19	3	0	74	39
Snails	3	0	1	5	0	0	9	7
Clams	23	0	2	0	0	0	25	19
Crustaceans	3	0	0	1	0	0	4	1
Insects	8	0	0	5	0	0	13	10
Plants	86	5	1	23	2	2	119	43
TOTAL	258	47	458	71	10	37	881	220**

*Separate populations of a species, listed both as Endangered and Threatened, are tallied twice. Species which are thus accounted for are the gray wolf, bald eagle, American alligator, green sea turtle, Olive ridley sea turtle, and leopard.

**More than one species may be covered by some plans, and a few species have more than one plan covering different parts of their ranges.

Number of Recovery Plans approved: 185
Number of species currently proposed for listing: 27 animals
29 plants

Number of Species with Critical Habitats determined: 91
Number of Cooperative Agreements signed with States: 42 fish & wildlife
17 plants

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